REPORT OF THE VIRUS REFERENCE LABORATORY, QUEEN'S UNIVERSITY, BELFAST, 1958

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THIS is the second report of the Virus Reference Laboratory established in the Department of Microbiology of the Queen's University of Belfast by the Northern Ireland Hospitals Authority. The first report covering the period 1955 to 1957 appeared in an earlier number of this Journal (Murray, Dane & Dick, 1958).

POLIOMYELITIS, ASEPTIC MENINGITIS, AND ENCEPHALITIS.

Poliomyelitis.

As in previous years, our aim has been to receive specimens from all notified cases. There were fifty-five of these in 1958, which excludes five cases originally notified but in which the diagnosis was subsequently revised. Of the clinically

TABLE 1.

SHOWING VIRUSES RECOVERED FROM NOTIFIED CASES OF POLIOMYELITIS.

NOTIFIED	No.	SPECIMENS FROM	No. FROM WHOM POLIOVIRUS Type 1	Type 2	Type 3	No. FROM WHOM ECHO OR COXSACKIE VIRUS	No VIRUS ISOLATED
Paralysed	47	45	17	0	20	0	8
Not Paralysed	8	8	2	0	2	0	4

confirmed notified cases forty-seven were paralysed and eight were not paralysed. The poliovirus types recovered from these cases are shown in Table 1.

Although serological surveys have shown that all three types of poliovirus are about equally common in Northern Ireland, this is the first year since 1955 (when isolation and typing of virus was started) that type 3 virus has been isolated from paralytic cases.

Specimens were obtained from most of these cases within a few days of onset of symptoms. The period of the year of isolation of the viruses is shown in Fig. 1 and the geographical distribution in Fig. 2. Included in these figures are five additional isolations from some additional infections and contacts which are discussed below.

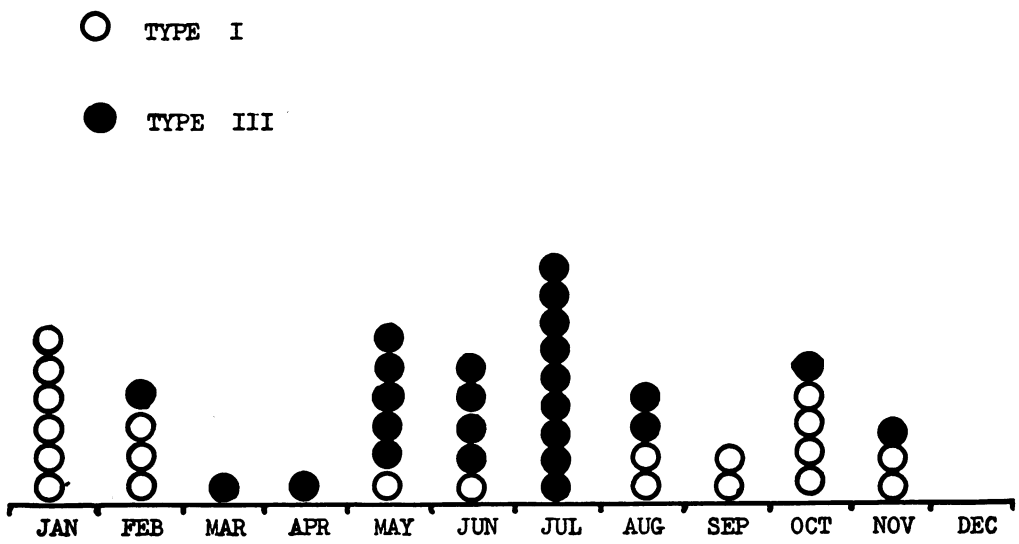

Fig. 1—Number of poliovirus isolations each month during 1958.

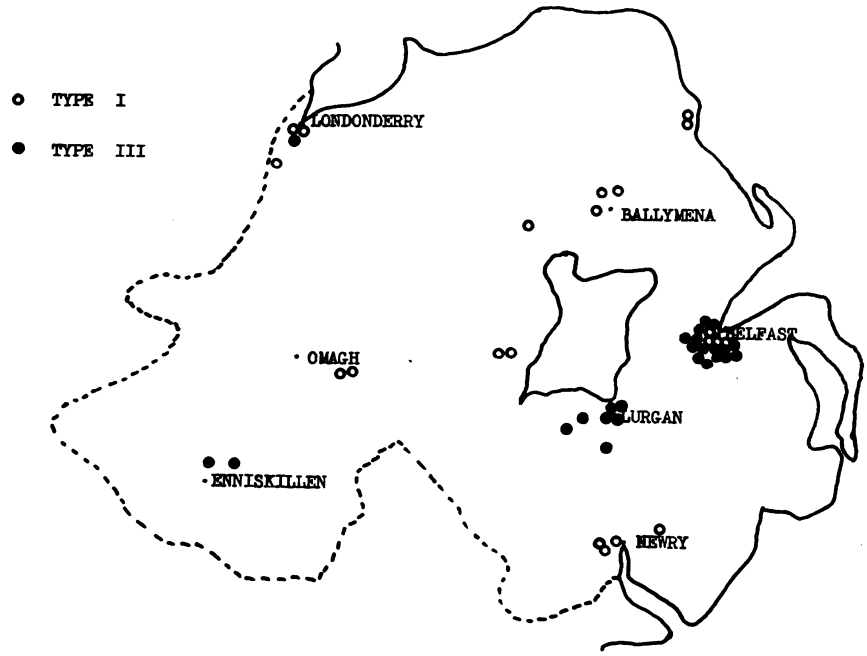

Fig. 2—Geographical distribution of individuals from whom poliovirus isolated.

It may be seen that the type 3 virus infections were practically entirely confined to the Lagan valley, and that, apart from that area, there were only a few sporadic cases in other parts of Northern Ireland.

Poliomyelitis Vaccine Surveillance.

Two cases of poliomyelitis have been recorded in vaccinated children during 1958. One of these was an infant of ten months with agamma-globulinæmia who became paralysed on 20th August, and from whom type 3 poliovirus was isolated. This infant had been given its first inoculation with formalinized vaccine in May and the second in June. The other was an eighteen-month-old child who developed paralysis on 11th August. He had been immunized with formalinized vaccine in March and April, 1958. Type 3 virus was also isolated from this child.

These findings do not constitute a break in safety, nor is there any question that the vaccine used was unsafe. Such cases serve as a reminder that the currently available vaccine does not give protection to more than 70 to 80 per cent. of immunized individuals.

TABLE 2.

SHOWING ETIOLOGY OF ASEPTIC MENINGITIS IN 1958.

CLINICAL DIAGNOSIS	NO. FROM WHOM FÆCAL SPECIMENS OBTAINED	NO. FROM WHOM VIRUS ISOLATED					NO. FROM WHOM SUITABLE BLOOD SAMPLES	NO. WITH SEROLOGICAL EVIDENCE OF MUMPS VIRUS
		Polio. Type 1	Polio. Type 2	Polio. Type 3	Echo Virus	Coxsackie Virus		
"Non-paralytic Polio" - - -	38*	2	0	2	1	1	11	4
"Lymphocytic or Aseptic Meningitis"	50	0	0	1	1	1	37	15
TOTAL ASEPTIC MENINGITIS -	88	2	0	3	2	2	48	19

*Including eight notified cases of "non-paralytic poliomyelitis."

Aseptic Meningitis.

In addition to the eight notified cases of "non-paralytic poliomyelitis," specimens were received from thirty patients with a provisional diagnosis of "non-paralytic poliomyelitis." These are considered as cases of aseptic meningitis, which is a much preferable diagnostic term and also includes the clinical term "lymphocytic meningitis." Indeed, it has been recommended by the World Health Organization (1958) that notification of "non-paralytic poliomyelitis" should not be made and that the term *aseptic meningitis syndrome (etiology unknown)* be used until the etiological agent has been identified when the diagnosis *aseptic meningitis syndrome (poliovirus type 1, 2 or 3)*, *aseptic meningitis syndrome (ECHO virus)*, etc., can be made.

It may be seen (Table 2) that the commonest identified cause of aseptic meningitis during 1958 was mumps virus. Poliovirus was isolated from only five of eighty-seven specimens examined (5.7 per cent.), which is in contrast to 1957—a poliomyelitis epidemic year—when 41 per cent. of cases of aseptic meningitis were found to have type 1 poliovirus in their fæces.

TABLE 3.

SHOWING ETIOLOGICAL IMPORTANCE OF MUMPS VIRUS IN C.N.S. INFECTIONS IN NORTHERN IRELAND DURING 1958.

CLINICAL DIAGNOSIS	No.	No. WITH SEROLOGICAL EVIDENCE OF INFECTION WITH / No. FROM WHOM SUITABLE BLOOD SAMPLES OBTAINED		
		Mumps	Louping Ill R.S.S.* Encephalitis	Lymphocytic Choriomeningitis
Mumps Encephalitis	21	16/21	0/21	0/21
Encephalitis	47	5/20	1/45	0/45
Aseptic Meningitis	102	19/48	0/77	0/77
TOTAL	170	40/89	1/143	0/143

*Russian spring summer.

Encephalitis.

Mumps encephalitis (Table 3) was quite frequently diagnosed clinically during 1958 and Dr. C. M. B. Field (personal communication) told us that he has never before seen so many cases of meningo-encephalitis associated with mumps. Although the clinical picture of uncomplicated mumps has not changed since the time of Hippocrates (see Adams, 1891), it seems that from time to time there is a change in the neurotropism of the virus or in the host which leads to involvement of the C.N.S. In addition to the patients diagnosed as having mumps encephalitis, five patients with encephalitis of possible viral etiology were shown to have infection with mumps virus. It may be seen from Table 3 that, including the patients with a clinical diagnosis of aseptic meningitis, there was a total of forty infections with mumps virus giving rise to C.N.S. signs and symptoms.

The seasonal distribution of the forty cases of mumps encephalitis are shown in Fig. 3.

Encephalitis due to louping ill/Russian-spring-summer encephalitis virus was established in one case of encephalitis and type 3 poliovirus was recovered from another. In the louping ill infection the patient was a farmer, aged 24, who had removed a tick from his shoulder two days before the onset of his illness, and had been shearing sheep ten to fifteen days before this. The serum from this patient was the only one to give a positive result against louping ill/Russian spring-summer encephalitis virus out of one hundred and forty-three tested during 1958.

Other C.N.S. Infections.

In none of one hundred and forty-three patients tested was there evidence of infection with the virus of *Lymphocytic choriomeningitis* (L.C.M.). Indeed

no infection with L.C.M. has been diagnosed in Northern Ireland since the Virus Reference Laboratory started investigations.

In addition to the cases of paralytic poliomyelitis notified to the Ministry and clinically confirmed (Table 1), specimens were received from twenty patients in whom a provisional diagnosis of paralytic poliomyelitis had been made. No poliovirus or other enteric virus was isolated from fæcal samples from any of these patients nor was there any evidence that they had had recent infections with mumps, louping ill or L.C.M. viruses.

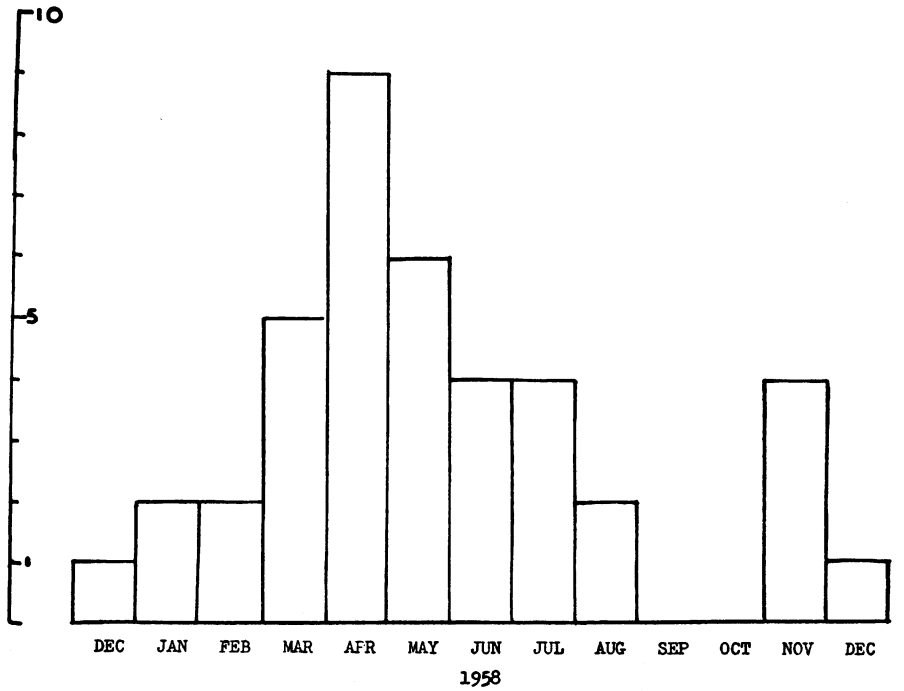

Fig. 3—Monthly incidence of mumps meningo-encephalitis confirmed by laboratory tests.

Miscellaneous Isolations of Enteric Viruses.

As seen from Table 2, two ECHO viruses and one Coxsackie virus were isolated from cases of aseptic meningitis. Studies are in progress to establish the ætiological importance of the ECHO and Coxsackie group of viruses recovered during the past four years in aseptic meningitis and other conditions (see Report, 1957). The identification of these viruses to date, from cases of aseptic meningitis, is shown in Table 4.

During 1958 Coxsackie A9 virus was also isolated from two patients with a clinical diagnosis of Stevens-Johnson syndrome and exfoliative dermatitis respectively. There is as yet no evidence that this virus has anything to do with the etiology of these infections.

In addition to the isolations of poliovirus for diagnostic purposes re-isolations of type 1 virus were made in a paralytic patient during convalescence, and two strains of type 3 were made from contacts of paralytic patients.

Respiratory Virus Infections.

Influenza

As part of the World Health Organization influenza spotting scheme, the laboratory continued attempts to detect the presence of influenza virus in the community with the collaboration of a number of general practitioners. During

TABLE 4.

Showing Enteric Viruses other than Poliovirus isolated from Fæces of Patients suffering from Aseptic Meningitis Syndrome.

Virus	1955	1956	1957	1958
ECHO 3	–	–	–	1
ECHO 6	–	–	–	1
ECHO 9	–	3	11	–
Coxsackie A9	–	–	1	1
Coxsackie B2	–	–	1	–
Coxsackie B3	–	–	2	–
Coxsackie B4	7	–	–	–
Miscellaneous Enteric Viruses*	4	1	4	2

*These viruses cannot, at the moment, be classified.

1958 influenza virus was isolated only during January and March. A total of eight strains of virus were recovered, of which six were typed and found to be A (Asian) strains. Excluding the eight patients from whom virus was isolated, the following tests were made on patients' sera for evidence of recent infections with influenza virus.

Virus	No. Tested	No. Positive
Influenza A	76	0
„ B	70	0
„ C	3	0

It may be concluded that the influenza viruses played only a small part in causing influenza-like illness during 1958.

Adenovirus Infections.

Sera from sixty-four patients were tested for adenovirus infections. Only one case was diagnosed by a rise in antibody in paired sera. The patient was a young doctor who had symptoms of rhinorrhœa, conjunctivitis, and headache. Thus,

during 1958 as in 1957, adenoviruses appear to have been an uncommon cause of respiratory infections in Northern Ireland.

Psittacosis.

Sera from one hundred and twenty-nine patients were tested against the psittacosis group of viruses with negative results. To date, sera from two hundred and sixty-seven individuals in Northern Ireland have been tested with no evidence of any recent infections with psittacosis or related viruses.

Special Investigations.

Dermatological Investigations.

In collaboration with Dr. J. M. Beare attempts have been made to isolate an infective agent from *pityriasis rosea.* These studies have so far been negative. We are anxious to see patients with this condition at the earliest stage of onset when the "herald spot" is present and before the onset of the rash, and we shall be grateful for the co-operation of general practitioners in this. Studies have been made in tissue culture of material from a number of cases of *molluscum sebaceum* without providing evidence on the nature of this condition.

Abortions.

In Belfast during 1957 more than 10 per cent. of pregnancies did not go to term, and there are over one thousand abortions each year in the city (Mr. H. I. McClure, personal communication). There are several viruses which are known to cause abortion in domestic animals, and the possibility that viruses might be responsible for some human cases of abortions prompted the following investigation. Attempts were made to isolate virus, in the yolk sac of developing chick embryos and in HeLa cells, from the conceptum of twenty-two selected individuals. The results were entirely negative, nor was there any serological evidence of past or recent infection with the enzootic abortion-psittacosis group of viruses.

Complement Fixation Test in Poliomyelitis.

The possibility of using the complement fixation test (C.F.T.) in the diagnosis of acute poliomyelitis has been investigated. We concluded that this test is of less value in the prompt and accurate diagnosis of the disease than virus isolation from fæcal specimens. A similar conclusion has been reached by several American virologists working on the same problem.

The C.F.T. is of some value in diagnosis when no virus has been isolated. We have used it in the investigation of special cases such as those following inoculations where a diagnosis, even though it is late, may be of public health importance.

The 1957 epidemic of poliomyelitis in Belfast has been the subject of close study by members of this department and also by Dr. S. N. Donaldson of the Belfast City Health Department. In this study (to be published) the C.F.T. was of considerable value in arriving at an accurate diagnosis in the few cases of possible poliomyelitis from whom no virus was isolated.

Budgerigars and Poliomyelitis.

The reported isolation of poliovirus type 1 from a sick budgerigar in a household in Scotland where a child had died of poliomyelitis by Somerville, *et al.* (1958), prompted an investigation of the possibility that budgerigars might play a part in the epidemiology of some cases of poliomyelitis. The result of this study, which has been published (Dane, Dick & Donaldson, 1959), indicates that it is most unlikely that budgerigars play any part in the natural history of poliomyelitis.

Discussion.

In addition to the tests recorded above a large number of miscellaneous specimens were sent for virus studies. Specimens sent from many patients were such as to make it impossible for the laboratory to give any diagnostic help. While virus isolation provides the most useful rapid result for some diseases such as poliomyelitis and other enteric viruses, in the diagnosis of many other infections serological tests are more convenient. For serological diagnosis, two samples of clotted blood are required, which are usually referred to as paired sera. The first sample should be taken as soon as possible during the acute phase of illness and the second sample two to three weeks later. Unfortunately with presently available techniques it is seldom that a diagnosis can be made on a single serum. We and many physicians have been perhaps disappointed in our failure to produce an answer in some infections, but very often the reason has been that only a single late specimen of blood has been available. It is certain that with suitable specimens more infections would have been diagnosed. In a previous number of this Journal detailed information on the types of specimens which are required for virological studies was given (Dick and Dane, 1958).

A number of specimens were received from patients with infective hepatitis. There is as yet no virological test for virus hepatitis, and we now have an adequate supply of infective hepatitis material for research purposes.

We hope this year to undertake studies on the viral etiology of glandular fever and are anxious to obtain throat swabs, fæcal and blood samples from patients with this illness. We would also be grateful for co-operation in obtaining throat swabs and blood samples from patients with german measles and from small children with respiratory illnesses in which a number of newly discovered viruses have been recently reported.

We wish to acknowledge the co-operation which we continue to have from the staff of the Northern Ireland Fever Hospital, from the pathologists and other consultants in Northern Ireland and from the College of General Practitioners and Medical Officers of Health.

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